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Profiles are presented of two middle schools designed to improve the transition of elementary pupils to a modern high school program featuring individualized, self-directed study and research. One school uses a cluster plan, the other a compact design. The descriptions emphasize why the schools were designed as they were and how they were designed and built. Schematics and photographs are included along with evaluations of the schools in relation to the program for which they were planned. (FS)

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Profiles of Significant Schools

TWO MIDDLE SCHOOLS SAGINAW TOWNSHIP, MICHIGAN

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September, 1960

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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New Ideas for School Design

Communities all over the United States are building new schools. But not every administrator, architect, and school board member can tour the country looking at the latest developments in school planning and design.

To provide people engaged in school building with a detailed knowledge of the most adventurous new schools, EFL is publishing this series of reports, entitled Profiles of Significant Schools. The reports attempt to show two things: why the school was designed as it was, and how it was designed and built. In order to do this, the Profiles will explore the educational program (which may in itself be unusual), any architectural innovations the design may contain, and any special features that may be of interest, such as air conditioning, flexibility or open planning.

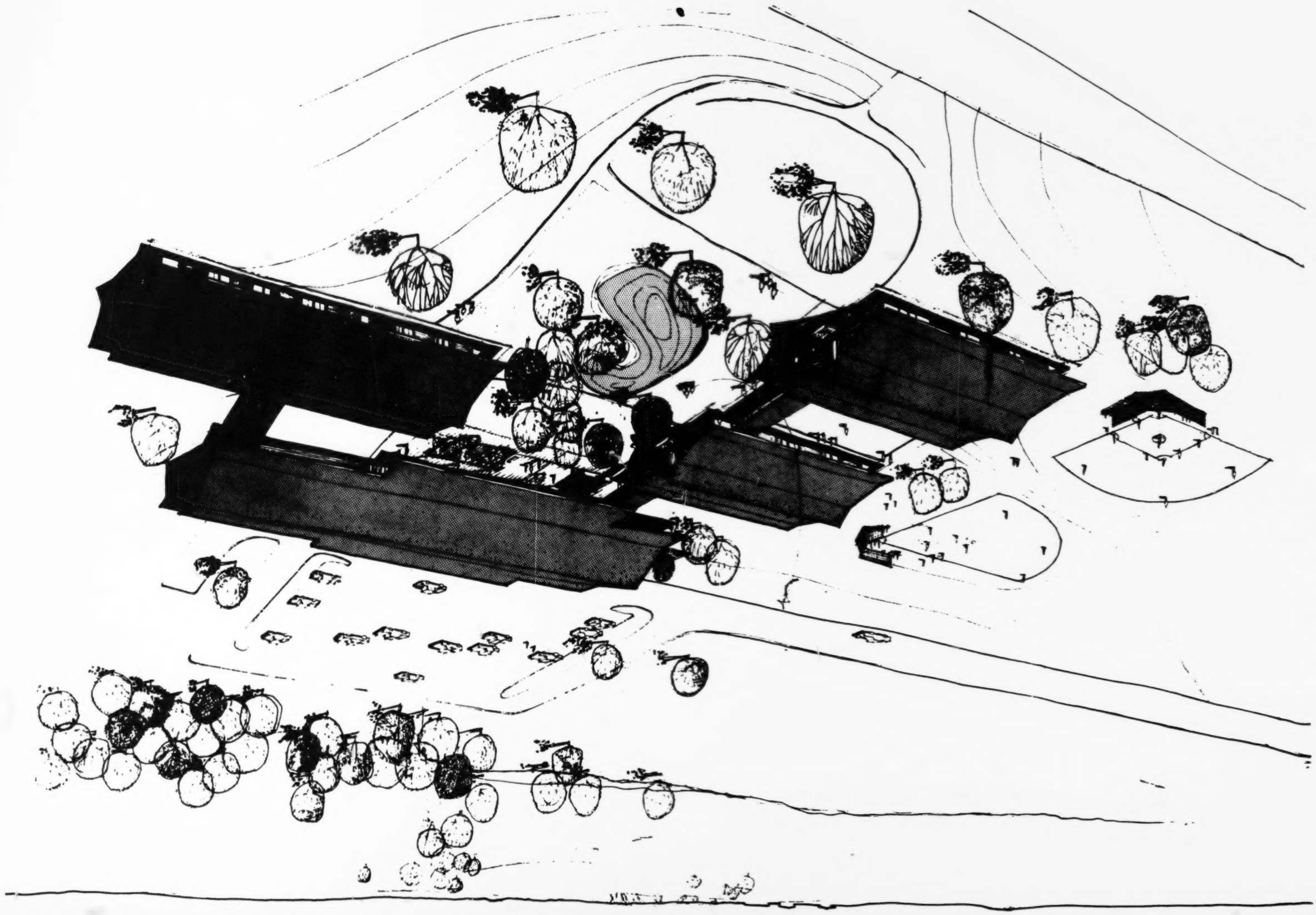
These are Profiles of individual schools, built in individual communities, to house individual programs. These schools will not necessarily serve ideally in other communities, but many of the ideas incorporated in them are applicable in many places. We hope that people involved in school planning and building will find the ideas stimulating and useful.

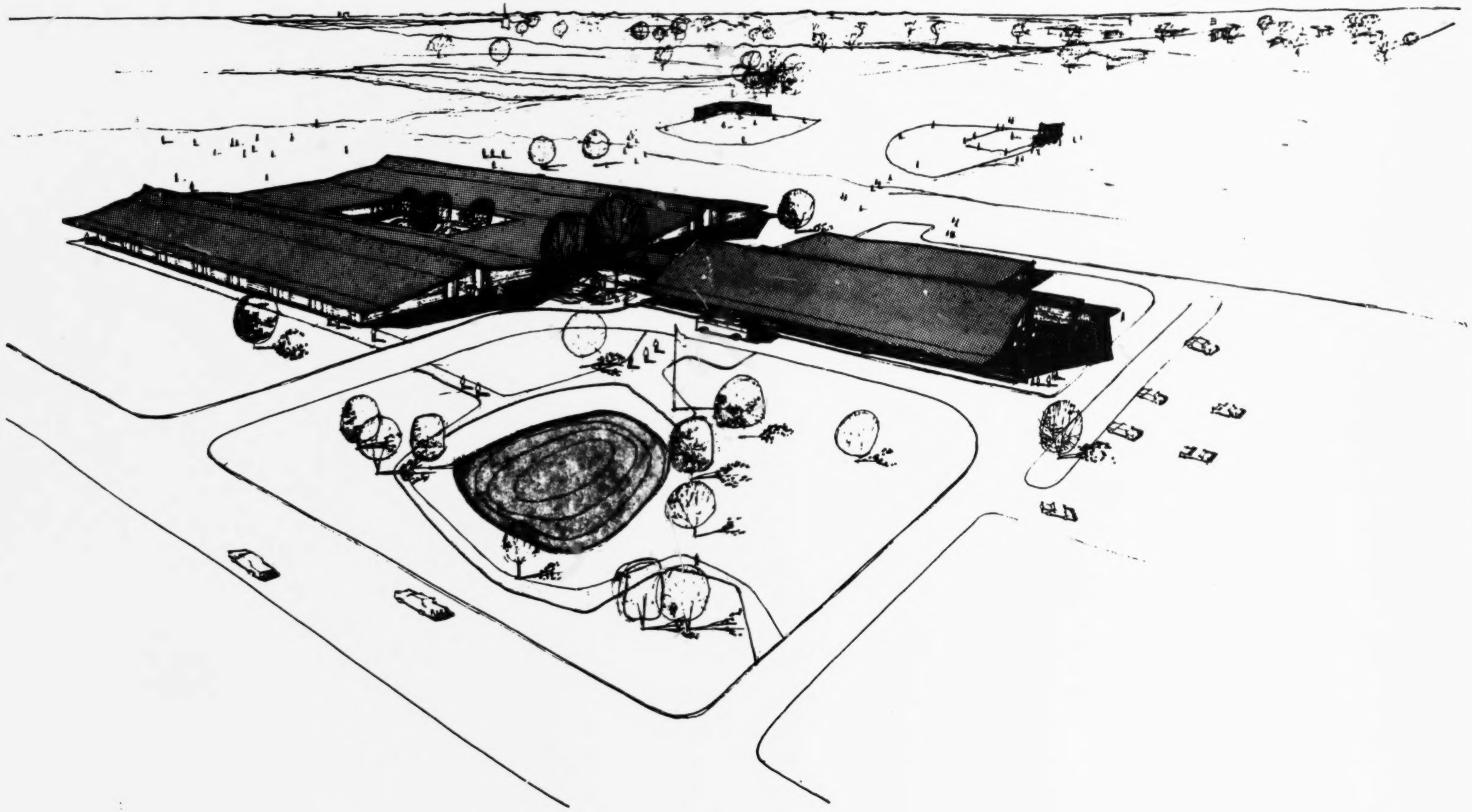
We would appreciate your reactions to the series as well as suggestions for making future Profiles more useful.

Schools:	Two Middle Schools Saginaw Township Michigan
Grades:	5 - 8
Capacity:	650 each
To Open:	September, 1960
Architects:	Caudill, Rowlett & Scott Texas, Oklahoma, Connecticut
Associated Architects:	
North School:	Spears & Prine
South School:	Daniel W. Toshach
Superintendent:	George E. Mills
Assistant Superintendents:	A. Mills Wilber Burton K. Thorn

Saginaw Township, Michigan, is a suburban area bordering the industrial city of Saginaw. Its population is now 16,000, but growing rapidly. In 1958, the exclusion of its high school students from the Saginaw city schools caused the Township to consolidate its five separate school districts. One result of consolidation has been a five-year, $7,000,000, school building program, including a new high school, the two Middle Schools, elementary schools, and additions to existing elementary schools.

NORTH SCHOOL





SOUTH SCHOOL

The two Saginaw Township Middle Schools are a departure in American education - a program for grades five through eight with instruction, space, and facilities tailored to fit the educational aims of each grade.

Each school contains the same amount of space and the same distinct kinds of space to accommodate each grade. The academic areas of both schools are built on the same repeated structural element. Yet, because of varying site conditions, each school arranges its similar spaces differently. One school is a cluster plan, the other a compact design.

Both schools follow an open plan design - two classrooms face each other across an open space which can be used as a common area or divided up to suit the special needs of a particular grade. Both schools cost about the same amount of money and are adaptable to different kinds of programs.

The Aims of the Middle Schools

The Saginaw Township Middle Schools seek to improve the transition between the self-contained classroom of the typical elementary school and the diverse environment with an emphasis upon individual responsibility which the students will encounter in Saginaw Township High School. The program of the new high school, to be ready for occupancy in September, 1961, will be based upon classes varying in size from large lectures to seminars. The high school students will be encouraged to undertake individual study and research and will be expected to shoulder an increasing share of the responsibility for their own education. The teachers will operate more as catalysts, as guides to sources of learning, rather than as dispensers of knowledge.

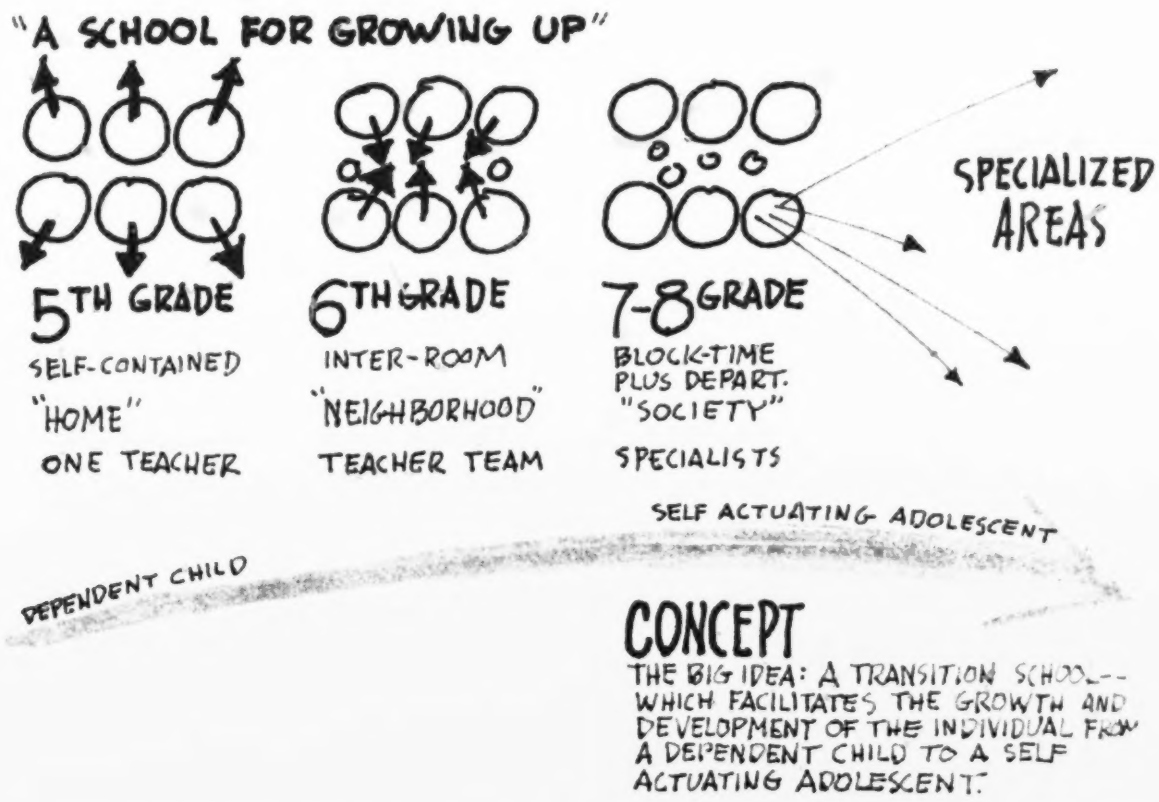
The Middle Schools, then, are designed to introduce the children of Saginaw Township to this new kind of high school program - to accustom them gradually to the idea of a more self-directed education.

Students at a Middle School begin their transition by moving from a self-contained classroom in a primary school to a quite similar situation in the new school - 25 to 30 children housed in a single classroom. Here the children will become acquainted with the open, less restricted atmosphere of a middle school, but at the same time will have the needed security provided by one home base and one teacher.

In the sixth grade, the students begin to move into a different world, a situation more akin to a neighborhood than the home of their self-contained classroom. Here the teachers work in informal teams. The students, while assigned to one classroom and spending most of their time with one teacher, will move about to a moderate degree in different sizes and types of groups according to plans worked out by the teacher teams. The students themselves will be involved in the process of planning activities to the extent that they assume increasing responsibility for their own and each others welfare. A student will become acquainted with several teachers and different groups of children while remaining essentially attached to one teacher and one room.

In the seventh and eighth grades, the students - still working under the teacher team system - will spend half the school day in their home rooms. Here the home room teacher will be responsible for work in language arts and social studies, and for group guidance. This teacher will also assist the special foreign language teacher. As in the earlier grades, the teacher will also be responsible for individual guidance and counseling.

During the other half of the school day, the students will be in specialized classrooms receiving instruction from specialist teachers in math, science, home and practical arts, music, and physical education. In keeping with the Middle School philosophy, the seventh and eighth grade students will be encouraged to undertake increasing amounts of independent research work and individual and committee projects.

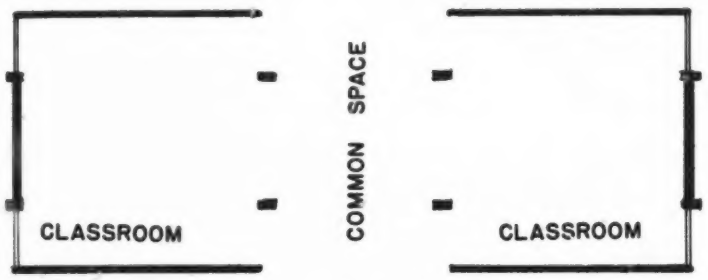


The idea behind the Middle School, as expressed in the architect's schematic of how the school program will work.

Open Planning

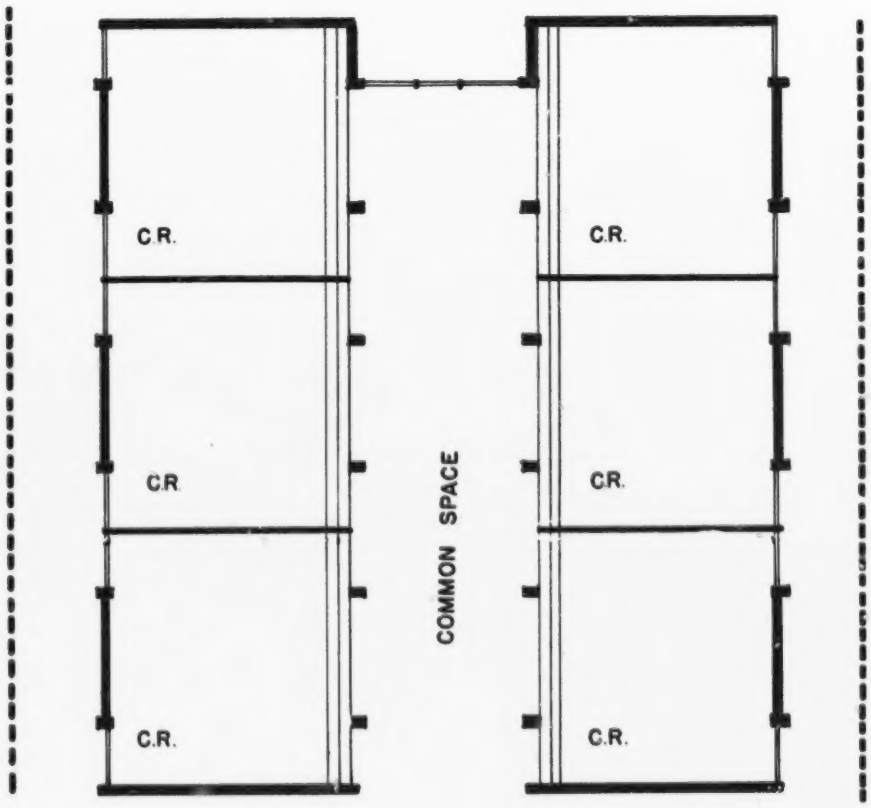
Given this unique program, the architects were faced with several challenges. They had to provide classrooms adaptable to three quite different programs. At the same time they had to build schools that would not be frozen in the middle school pattern - since the future program might be quite different from what it started out to be. And they had to do these things with a design that could be quickly executed since children had to be in the schools by September, 1960, six months after construction was begun.

The architects answered these challenges by designing a basic unit consisting of a pair of rectangular classrooms. (See diagram page 4) The open ends of each classroom face each other across a common space. The classroom spaces are similar for all grades in both schools - but the common spaces between are designed to fit the needs of each grade. Three of these units placed side by side form a six classroom section with a large common space running through the middle. The common spaces were then designed in various ways to accommodate the differing programs of each grade.



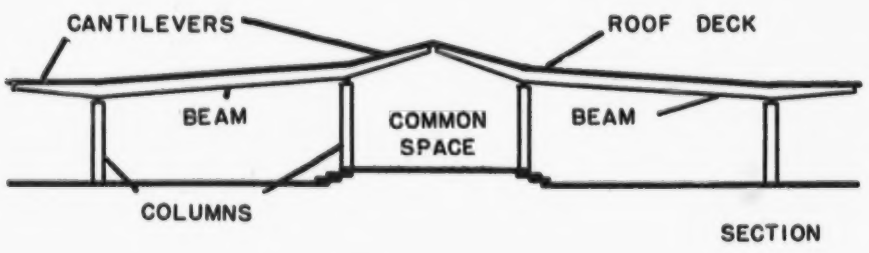
FLOOR PLAN OF C.R. UNIT

A unit is composed of two classrooms with a common space between them.



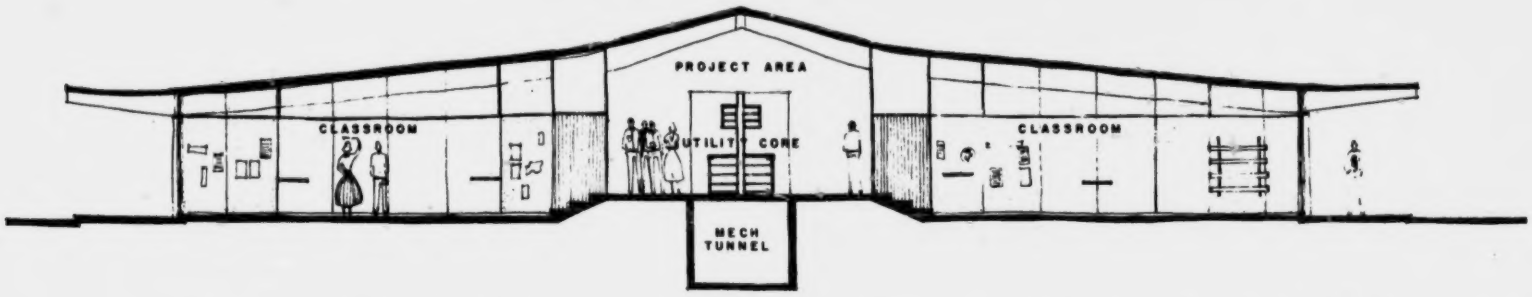
FLOOR PLAN FOR ONE GRADE

Three units put together contain the classrooms for one grade. Partitions are located at the center of alternate 15 foot wide building bays. The concrete columns that support the roof are near the partitions making common space suitable as a stage.



SECTION

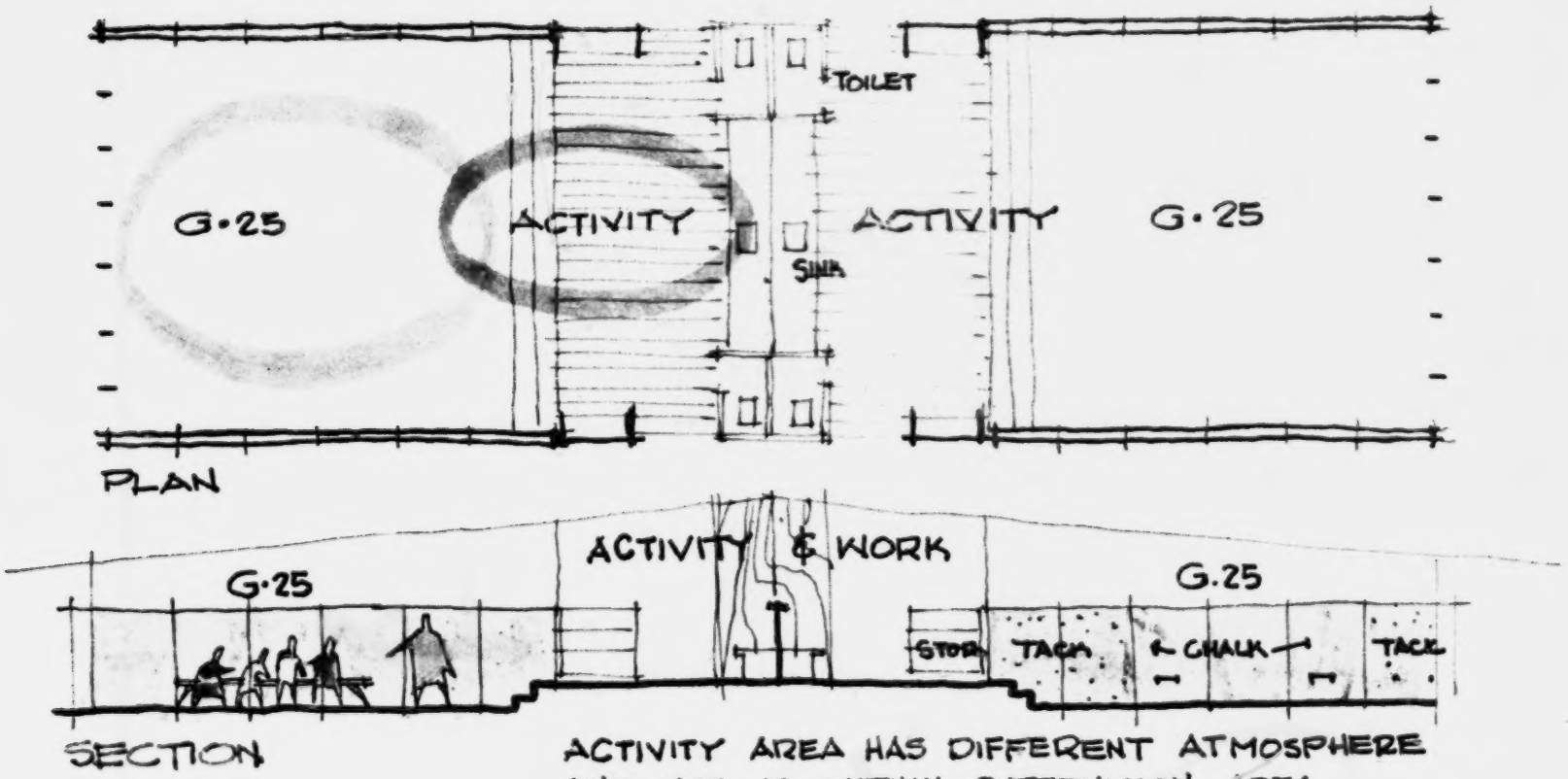
Laminated wood beams cantilever beyond the columns providing outside overhangs and leaving the common space between classrooms column-free. A wood deck spans between the beams. The ceilings of the bays that are not divided by partitions are covered with acoustic tile. The decks in other areas are left exposed. Each bay has two rows of fluorescent ceiling lights. (see sketch of classroom interior page 7.)



For the fifth and sixth grades the planners adopted the idea of providing a central platform by raising the floor of the common space three steps.

Classrooms in the fifth grades are separated by a raised platform containing a dividing partition and a utility core. The mechanical tunnel running underneath the platform supplies water, waste, electrical lines, and heat. The ceiling is raised to follow the variation in floor height. The sixth grade unit is designed in the same way but without the partition and elaborate utility core in the center of the raised area.

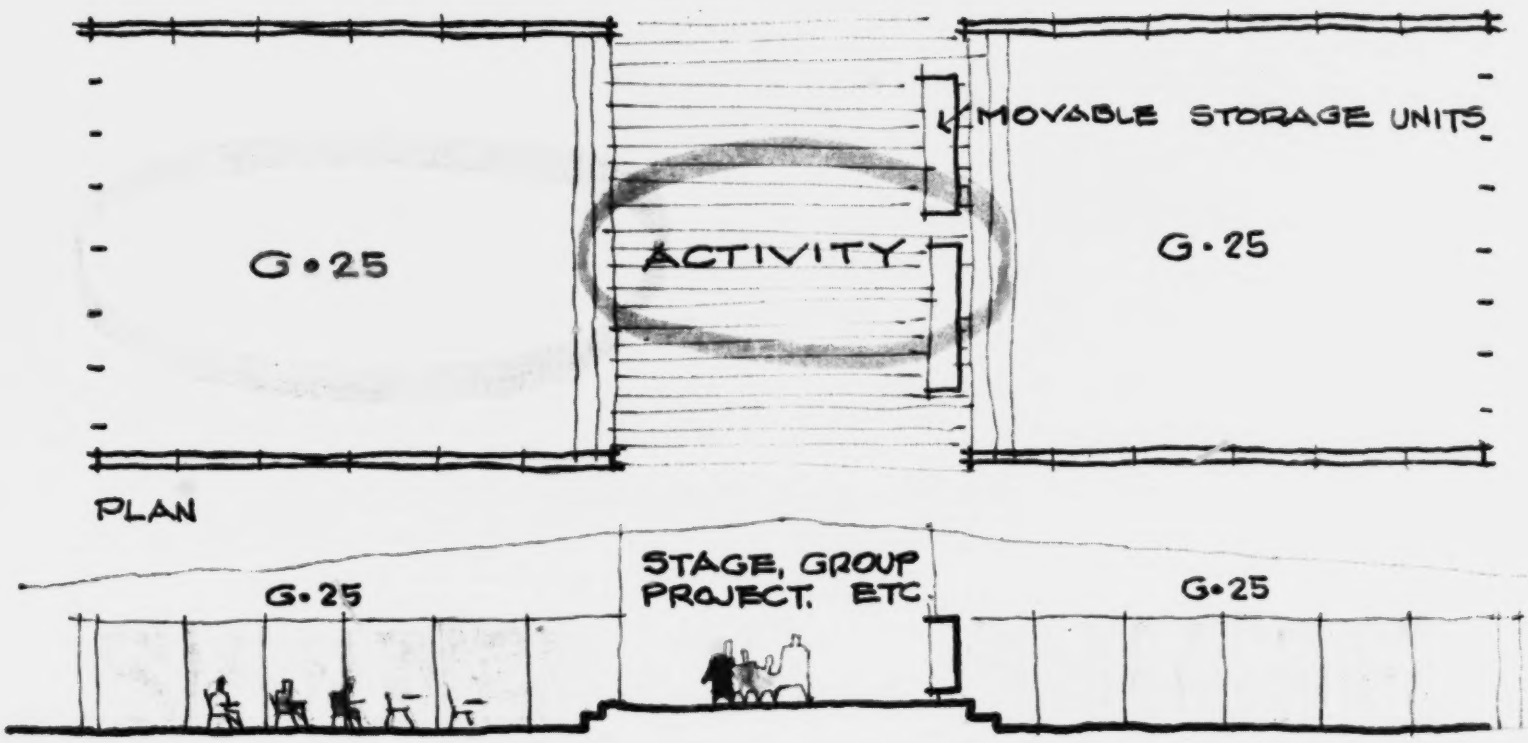
To maintain the self-contained atmosphere in the fifth grade classrooms, and yet at the same time introduce the children to an open plan school, the central common space between opposite classrooms is closed off with a frame partition running from floor to ceiling. Each classroom uses its side of the central space as a project area. Each project area has toilets, closets, cupboards, and a sink. The platform looks down to the classroom area and can serve as a stage. It also serves as a corridor.



In the fifth grade, the project area partition cuts off each classroom from its opposite member and restricts the class's activity to its self-contained unit.

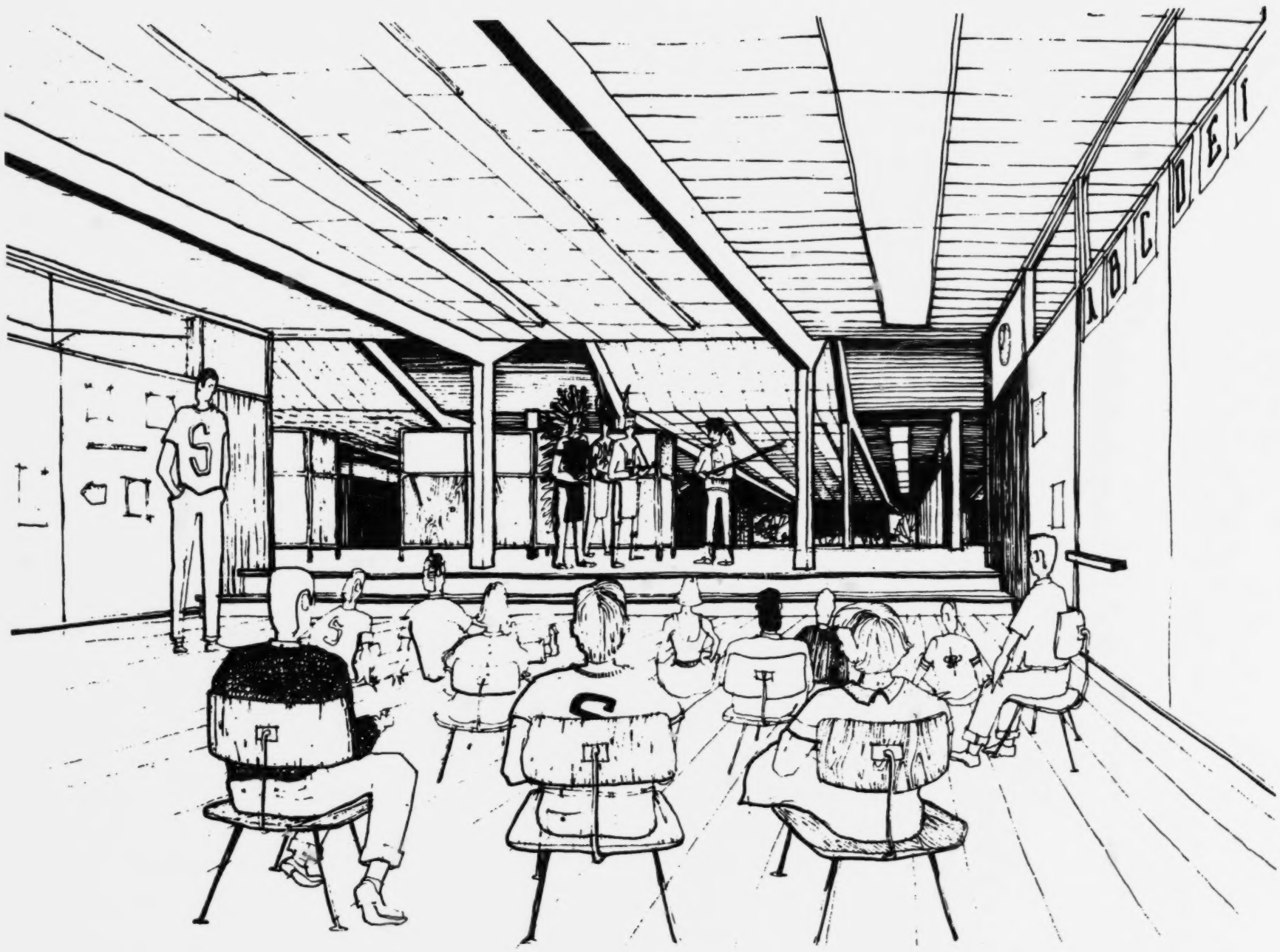
Although the project area partition blocks off each classroom from the one opposite it, there is not the same amount of isolation between a fifth grade classroom and its next door neighbor. Movable coat storage units can be placed in the corridor space on the platform for visual privacy, but there is no way of keeping sound from traveling around the ends of the side partitions. Complete isolation was not intended, since the fifth graders are supposed to begin learning here how to operate in the even more flexible and open spaces of the succeeding grades.

In the sixth grade, the central area is left almost completely open. With the teachers often operating as a team and with children arranged in groups of varying sizes, the uses of the common spaces are left up to the discretion of the teaching team. The only permanent facilitites are sinks and cupboards at each end of the common space. There are movable storage units and coat racks that the teachers can shift about to block off the spaces they want to use.



ACTIVITY AREA LARGE ENOUGH FOR GROUP PROJECTS. TWO G-25 INSTRUCTIONAL SPACES FUNCTION TOGETHER OR SEPARATE.

The central section in the sixth grade is left open to allow the teacher teams to use the space as they see fit.

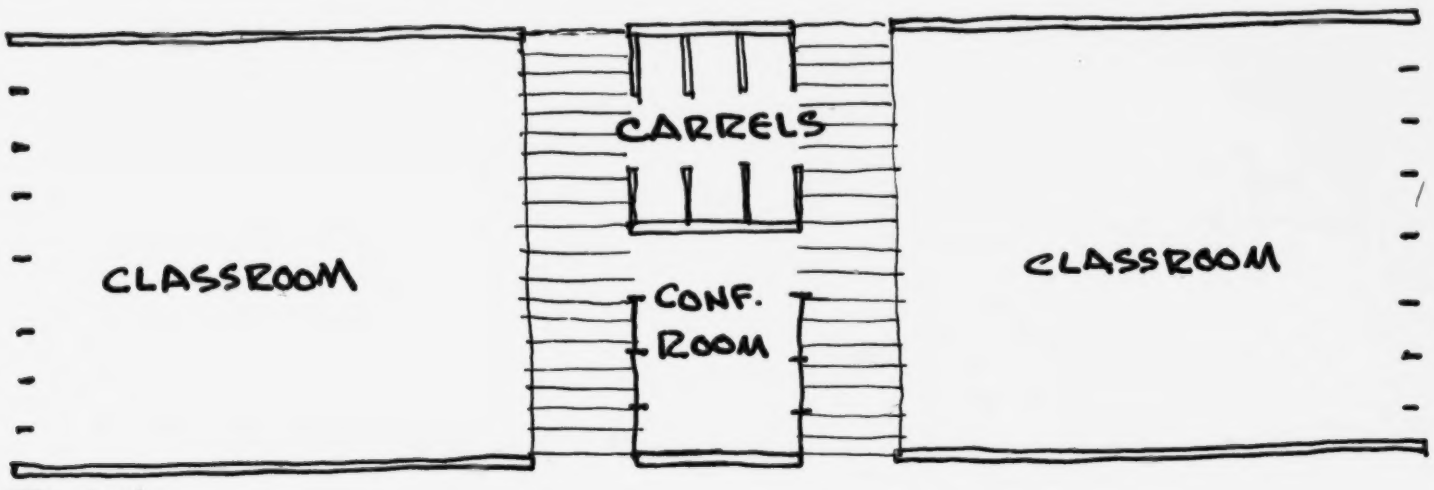


The raised platform in the sixth grade can be used for theatrical performances, committee work, and group activities.

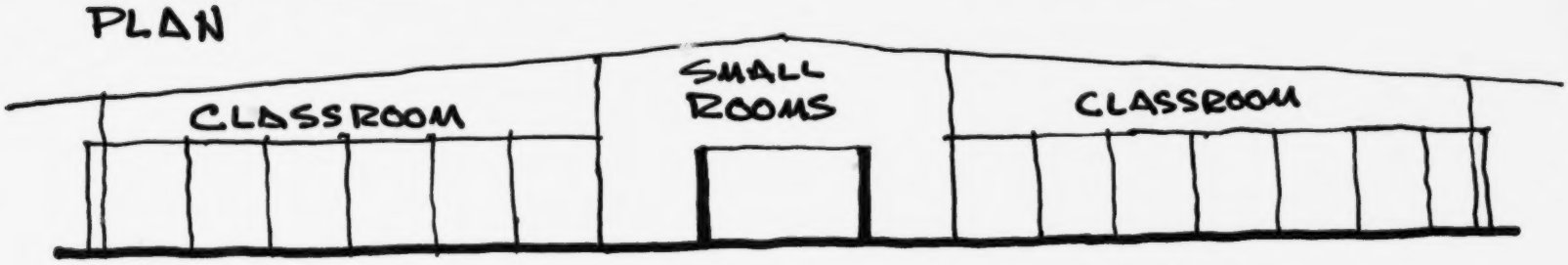
In the seventh and eighth grades, the space is arranged altogether differently. Instead of separate areas for each grade, the two grades are considered as a single unit. The total space is divided into two basic types: six open plan classrooms which operate as home rooms; and a specialized area devoted to separate space for science, mathematics, art, crafts, and home economics.

The common space between the six open plan classrooms still covers a mechanical tunnel containing the heating and ventilating ducts but is not raised. This common space is given over to individual study carrels and rooms for seminars. The teachers in these two grades continue the informal team approach begun in the sixth grade. Working within the general program, the teachers decide how the students are to be grouped and how the space is to be used. Some of the students will be meeting in regular classes in the home

rooms. Others will be studying on their own in the carrels or at the library. By the time the students have passed through two years of this kind of varied program, they should be well prepared to exercise the individual responsibilities that Saginaw Township High School will demand of them.



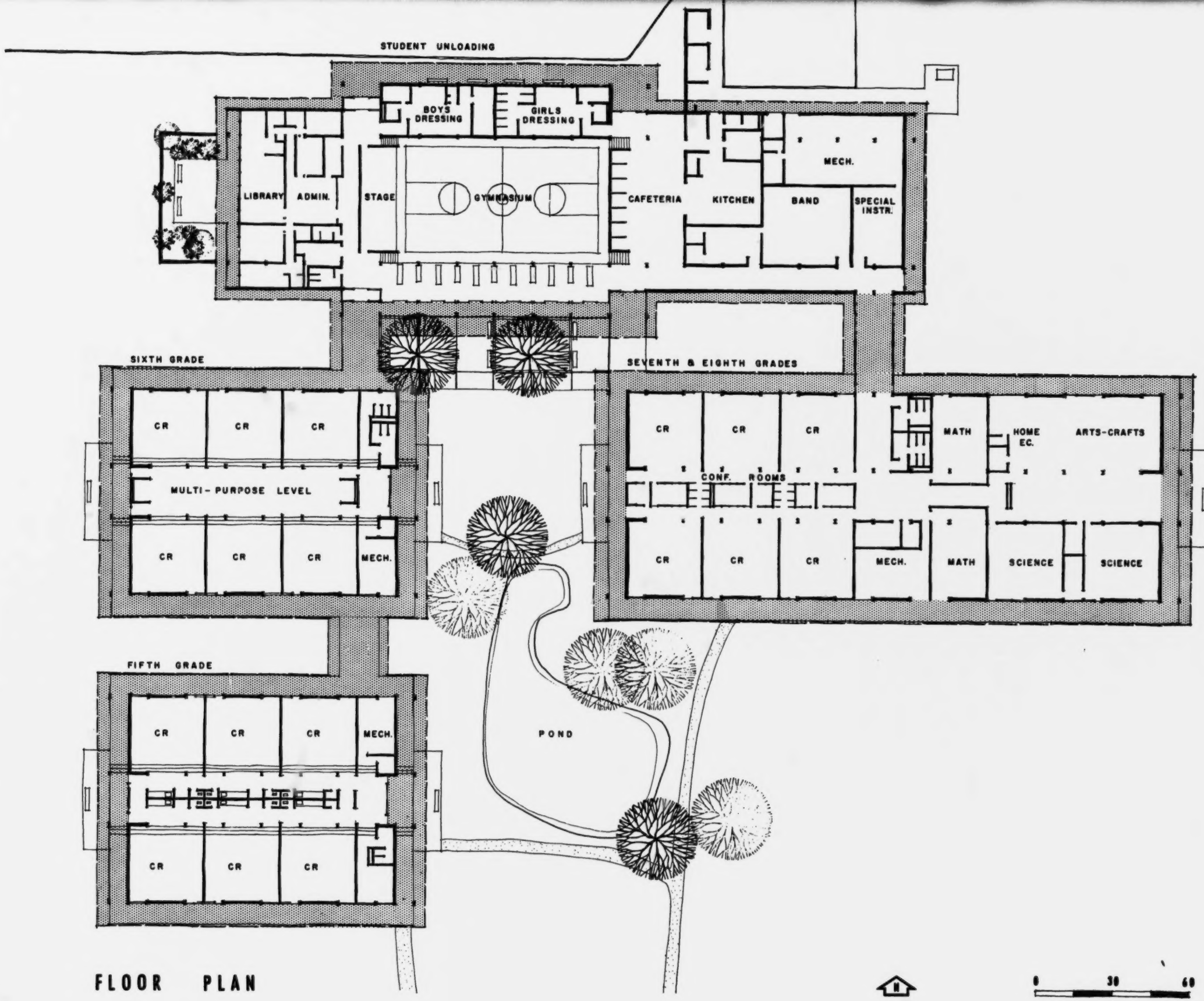
PLAN



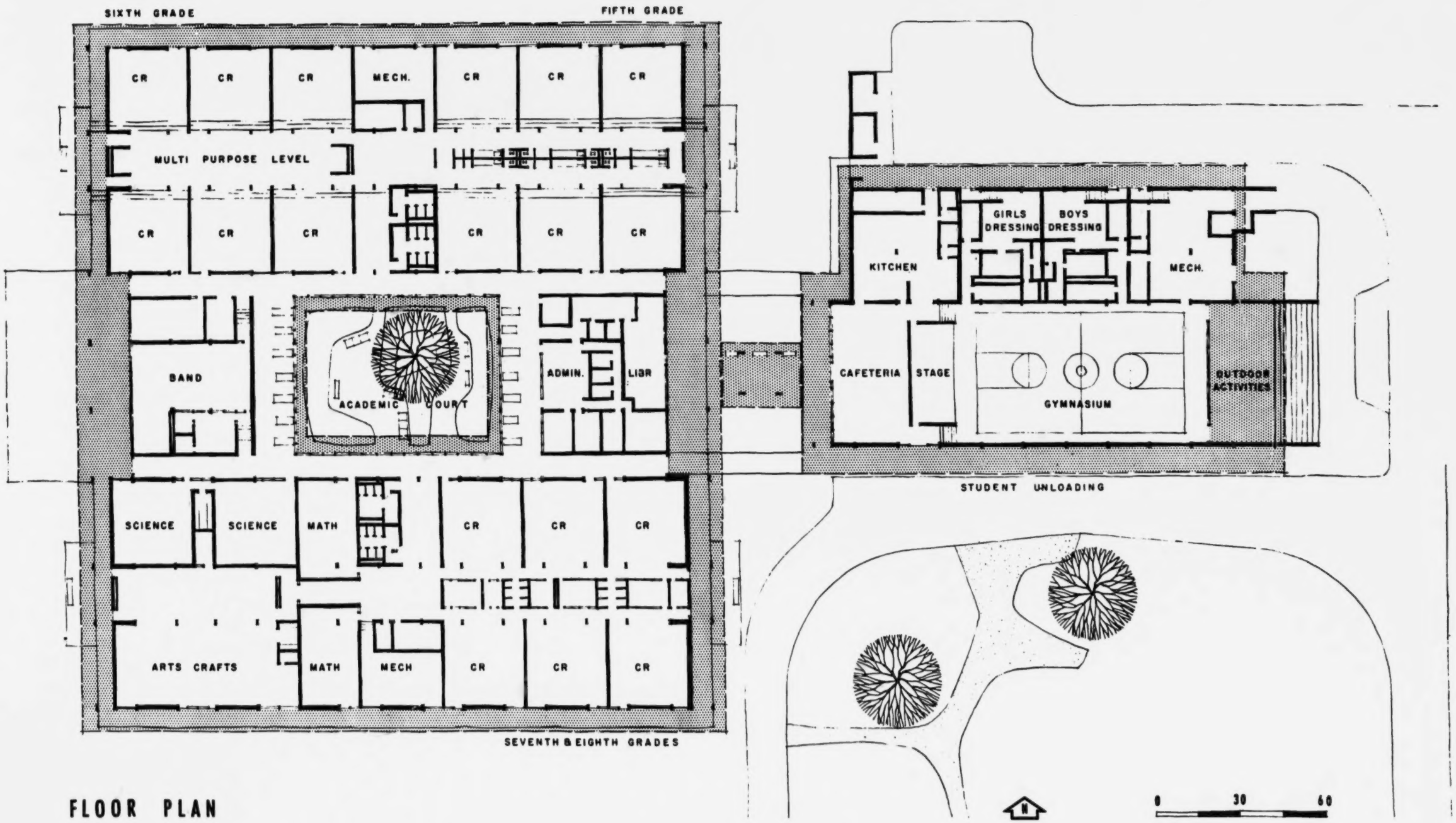
SECTION

THE SPACE BETWEEN THE CLASSROOMS IS DIVIDED INTO SMALL SPACES WHERE AN INDIVIDUAL CAN STUDY OR A SMALL GROUP CAN DISCUSS.

The seventh and eighth grade spaces make no attempt to isolate students in soundproof boxes. In these grades there will be a great deal of movement back and forth. The partitions that mark off the study carrels and the seminar rooms are open at the top, providing only visual isolation.



NORTH SCHOOL



FLOOR PLAN

SOUTH SCHOOL

Acoustics and Open Planning

The principal virtue of open planning in the Middle Schools is the freedom to use space for a variety of purposes. Because the architects used a repetitive bay with non-load-bearing partitions and free central space, the interiors of the schools can be to some extent rearranged during the school day or can be completely revamped if and when future programs demand it.

The open plan does present noise problems. These problems were carefully investigated by the architects and the educators before the final Middle School design was fixed.

The nature of sound is that it will bounce off hard surfaces (as sound bounces off a cliff and produces an echo), or it will go through lightweight material (such as vinyl folding doors). It will go around corners if it is free to travel through air (around the ends of open partitions in the Middle Schools).

Soft materials such as acoustic tile will absorb sound and stop it from bouncing. To stop sound from going through, dense, heavy materials must be used, and there can be no air leaks.

If the surfaces of a room are made of hard materials, sound which does not go through the walls will bounce around inside the room, and it will be difficult to hear because of excessive reverberation. If, on the other hand, the room has too many absorbent surfaces, little sound will bounce off the wall, and it will be difficult to hear because direct sound will not be reinforced by reverberent sound. The room will be acoustically dead.

A continuous sound, such as the noise produced by an air conditioner or an electric fan, will cover up or mask more distinct sounds. And a large number of sounds so mixed together that none is separately distinguishable (the background noise of a city) are less disturbing to concentration than a single, distinct sound of lower intensity (the dripping faucet at night).

At least in theory, with an adequate understanding of these acoustical facts of life, a fairly open space can be designed with "controlled acoustics." This space will not be totally quiet,

but a skillful manipulation of the acoustical elements will result in a noise level which is not disturbing to most people. The correct amount and type of soft, absorbent material can be combined with the correct amount and type of background noise - or acoustic "perfume" - to produce a usable educational environment. One source of background noise often used for this purpose is the carefully adjusted noise produced by the ventilating system.

In the classroom units of the Middle Schools, one half of the ceiling area is covered with sound absorbent acoustic tile. Background noise will be supplied by the ventilating equipment and by the activities of the various classes in each section of the building. The ceiling slope of the classrooms will assist in bouncing sounds originating on the platform to the rear of the rooms.

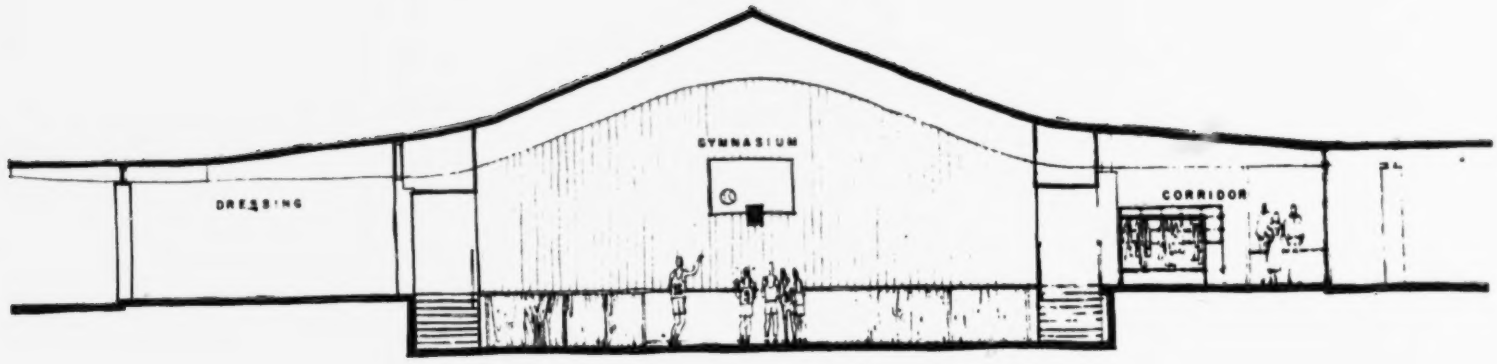
In planning these schools to be so open, the designers recognized the need to close off each classroom from the others, but they also wanted the children to be able to see beyond the confines of their own rooms. This openness of the classrooms is carried a step further by the side walls of the rooms. Instead of solid partitions from floor to ceiling, the tackboard or chalkboard walls go up only about 7 feet. The upper parts of the partitions are glass, making the classroom space in the Middle Schools seem even more open than it actually is.

Nonacademic Spaces

Each of the Middle Schools provides auxiliary areas in addition to the academic spaces. In both schools, the gymnasium, the cafeteria, the kitchen, and the mechanical room are in separate buildings.

Like the classroom building, the auxiliary buildings are constructed of uniform structural elements.

Another feature of the Middle Schools is the varied use to which the gymnasiums can be put. In each school a platform is placed at one end of the gymnasium, so it can be used for assemblies and theatrical programs. Both cafeterias will be used as auxiliary teaching space for special classes or for administering tests.

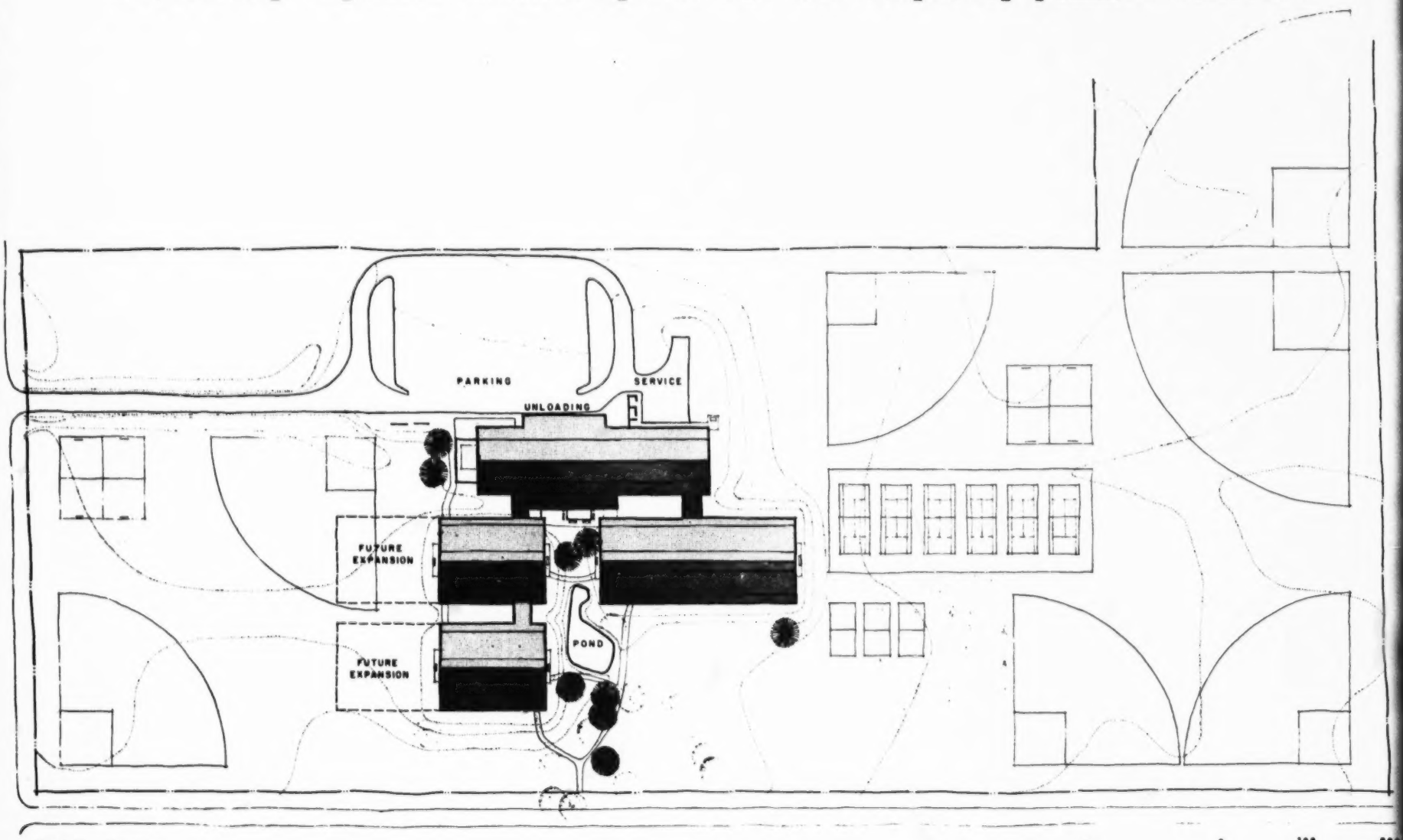


The gymnasiums of both schools use similar structural beams and arches of laminated wood. To preserve a continuity of roof heights among all of the buildings and at the same time provide the necessary interior height in the gymnasium, the gymnasium floors are sunk into the ground.

Two Different Open Plan Schools

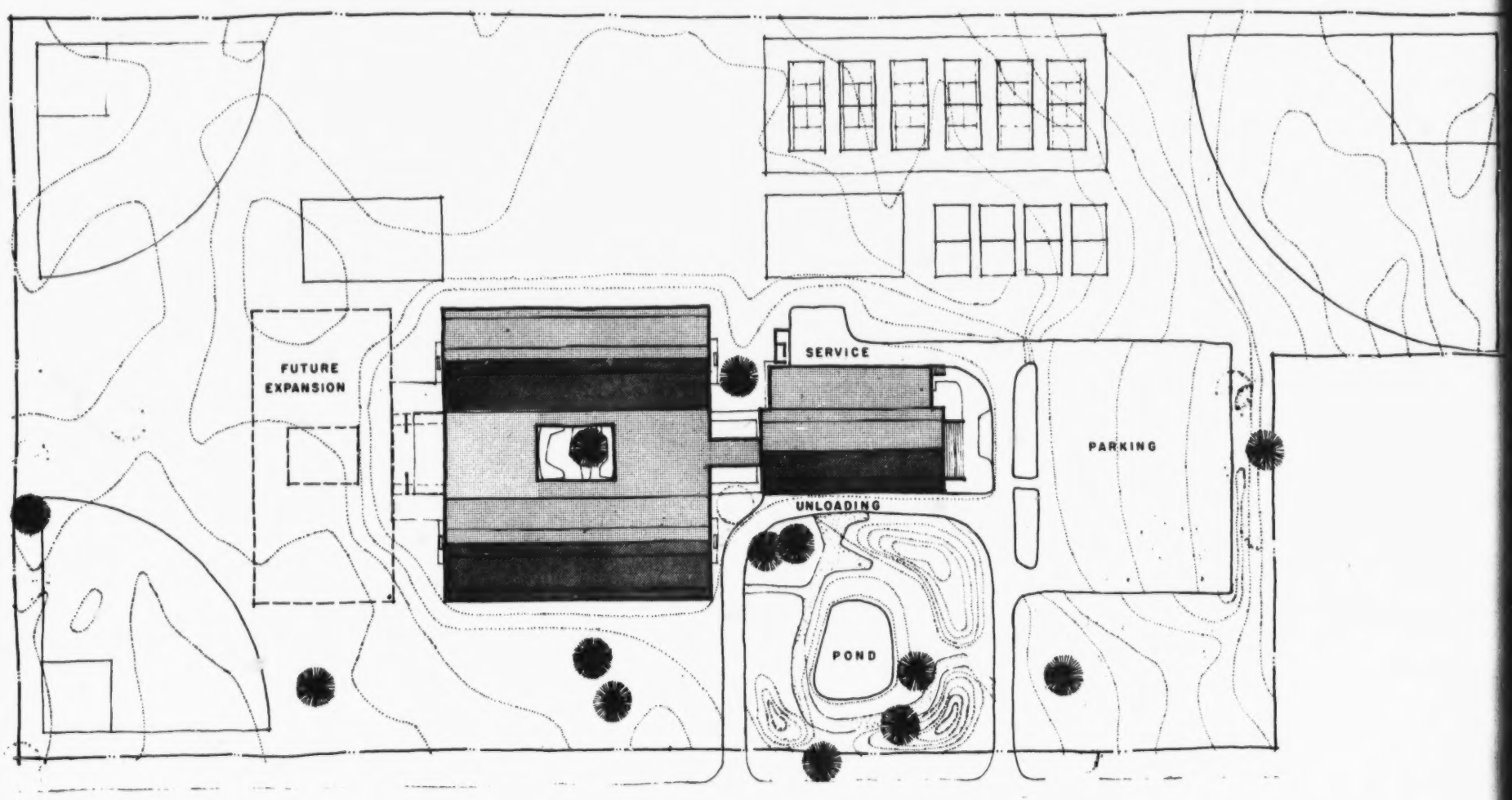
Although the programs and the basic arrangements of the educational spaces in the Middle Schools are exactly the same, the two schools are quite different in over-all shape and character.

The educators in Saginaw Township would have preferred to build two cluster plan schools with every classroom having a view of the outdoors. But one of the sites selected has only 18 acres of usable land compared to 24 acres at the other site. In order to have adequate playground space at the smaller site, it was decided that the school should be more compact. Compactness was not necessarily what the educators wanted, but it did have the virtue of providing an almost flawless test case in the cost and efficiency argument between spread-out and compactly planned schools.



The cluster plan of the North School provides a variety of building and outdoor spaces. Because of the generous site, this can be done without eliminating valuable play space.

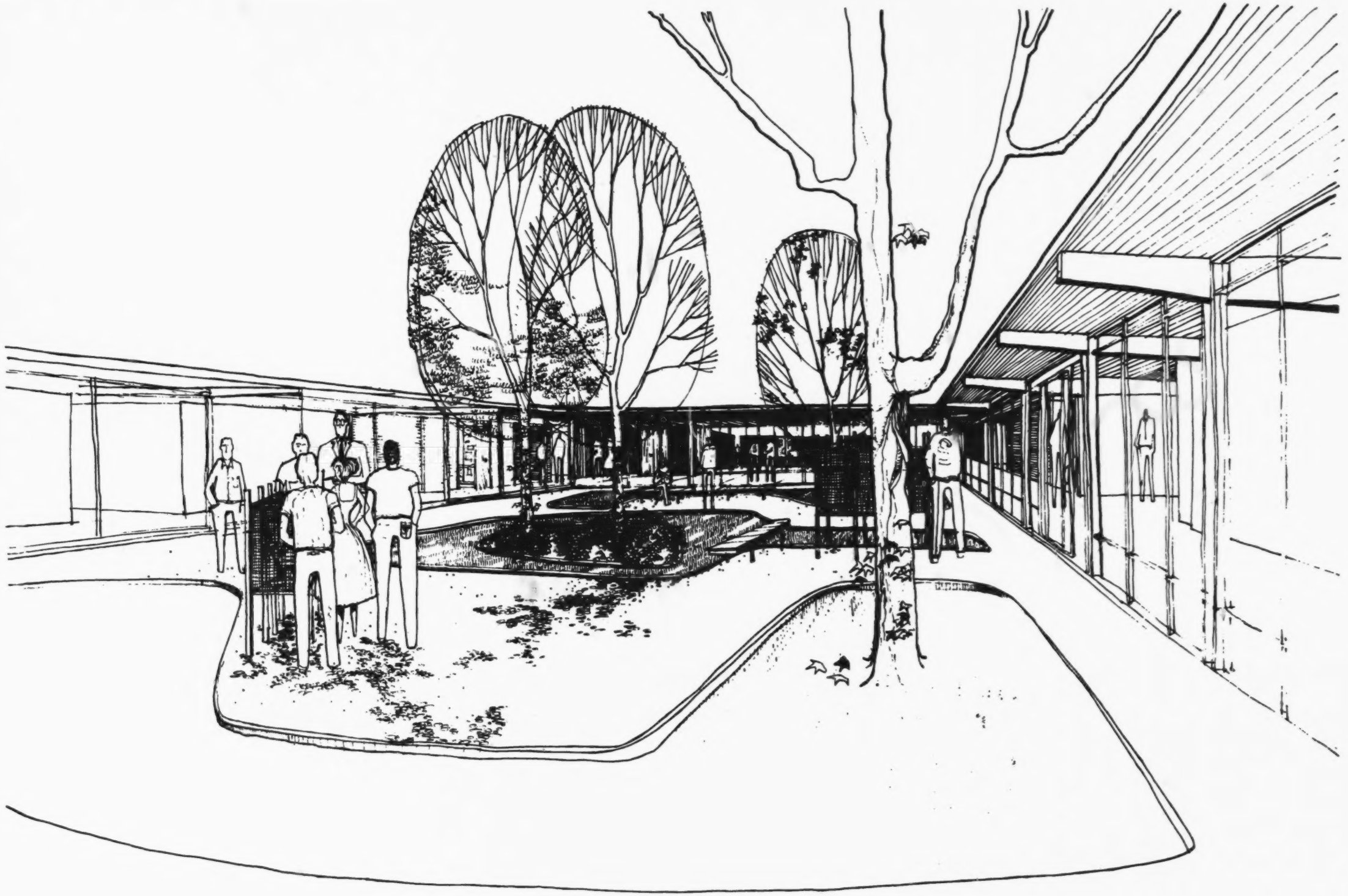
Here are two schools, similarly constructed, each housing exactly the same program and providing exactly the same facilities and the same amount of usable educational space.* Each school is built of the same materials at the same time by the same contractor. The only difference is that one is a cluster plan, the other a compact design. The Saginaw Township educators will have to wait for several years to find out which works best as a school, but they already have some answers to the question of which design is the least expensive.



PLOT PLAN

By making the South School compact, the architects were able to use the limited 18 acre site more efficiently. The compact building leaves larger spaces usable for playgrounds and athletic fields.

* See Area Breakdown, page 20.



The central courtyard of the compact South School provides interior rooms with the visual relief of greenery and open spaces.

Comparison of Costs

Both of the schools proved to be less expensive - 5½ per cent less expensive - than the architects estimated. The architects, although they have no way of being certain, attribute this unexpectedly lower figure to the use of repetitive structural elements. Because the contractor was able to purchase the materials and special items such as the laminated roof beams in quantity, the price was lower than the architects figured it would be. The repetitive bays also meant that the buildings could be erected more easily and quickly.

A comparison between the two schools breaks down this way:

	NORTH SCHOOL Cluster Plan	SOUTH SCHOOL Compact Plan	North School differs from South School by:	
Cost	$913,417	$882,442	$30,975 more	3.5%
Area*	62,441 sq.ft.	63,657 sq.ft.	1,216 sq.ft.less	1.9%
Perimeter	2,111 feet	1,663 feet	448 feet more	26.9%
Cost per square foot	$14.63	$13.86	$.77 more	5.6%
Cost per pupil	$1,405	$1,358	$47 more	3.5%
Square feet per pupil	96.06 sq.ft.	97.94 sq.ft.	1.88 sq.ft.less	1.9%

* Covered and paved but unenclosed areas figured at one-half.

There are two factors not apparent from the above table.

One is that the extra square footage in the compact school is devoted largely to enclosed corridors and not to usable educational space. The corridors in the cluster plan school are exposed to the

weather. (See area breakdown, page

The other factor is that most of the additional $30,975 spent on the cluster plan school went into three things: more brick and glass for the greater amount of exterior wall, and additional roof flashings, both resulting from the larger perimeter, and extra cost for utility lines and ventilating ducts because of the greater distances these lines must travel.

The conclusions that can be drawn from the comparison seem to be these:

1. In this particular instance, Saginaw paid less for each square foot of its educationally usable space in the compact school. It also paid a little less for the entire school and gained the additional advantage of protected passageways in wintry weather.

2. <u>But</u>, with the cluster design, Saginaw obtained for a comparatively small amount of money a decentralized schoolhouse, which some educators prefer.

CONSTRUCTION COST BREAKDOWN

	NORTH SCHOOL - Cluster Plan			SOUTH SCHOOL - Compact Plan		
		Cost	Per Cent* of Total		Cost	Per Cent* of Total
SITE						
Site Work (Excavation & covered walks)		$ 27,562	3		$ 35,312	4
BUILDING SHELL						
Footings, Foundations & Floors (Concrete, reinforcing steel)		90,070	10		90,800	10
Structural Frame (Concrete columns & wood beams)		61,200	7		60,400	7
Roof Deck		79,200	9		77,000	9
Roofing, Insulation & Flashing		47,877	5		44,847	5
Walls & Partitions						
Masonry	$ 60,800			$ 47,000		
Glass, Glazing & Windows	50,540			47,500		
Doors & Hollow Metal	2,100			2,100		
Miscellaneous Metal & Rough Carpentry	39,800	153,240	17	37,500	134,100	15
FINISHING & EQUIPMENT						
Interior Finishing (Tile, painting, plastering, finish carpentry, millwork, flooring, hardware, & acoustic treatment)		133,490	14		133,800	15
Plumbing, Heating, Ventilating & Cooling		167,508	18		158,423	18
Electrical Wiring & Fixtures		80,200	9		79,080	9
Miscellaneous Equipment		44,530	5		41,600	5
OVERHEAD						
Contractor's Job Overhead (Bond & insurance)		28,540	3		27,080	3
TOTAL COST		$ 913,417			$ 882,442	

* The figures are rounded off to the nearest per cent, and do not, therefore, total 100 per cent.

AREA BREAKDOWN

	NORTH SCHOOL - Cluster Plan				SOUTH SCHOOL - Compact Plan			
			Square Feet	Sq.Ft./ Pupil			Square Feet	Sq.Ft./ Pupil
CLASSROOM AREAS (Classroom and common spaces between the classrooms)			26,924	41.42			26,864	41.33
AUXILIARY AREAS								
Gymnasium & Lockers	4,591	7.06			5,178	7.97		
Cafeteria & Kitchen	2,388	3.68			2,222	3.42		
Administration	1,197	1.84			1,141	1.75		
Auditorium & Stage	585	.90			510	.78		
Music Rooms	1,464	2.25			1,376	2.12		
Library	739	1.14			719	1.11		
TOTAL AUXILIARY			10,964	16.87			11,146	17.15
SERVICE & STRUCTURE			16,739	25.75			18,329	28.20
TOTAL ENCLOSED AREA			54,627	84.04			56,339	86.68
UNENCLOSED, COVERED, PAVED	15,628 sq.ft.@½ =		7,814	12.02	14,636 sq.ft.@½ =		7,318	11.26
TOTAL AREA			62,441	96.06			63,657	97.94

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Here They Learn,	First Annual Report
Ring the Alarm!,	A Memo to the Schools on Fire and Human Beings
Design for ETV,	Planning for Schools with Television
The Cost of a Schoolhouse,	A Review of the Planning, Building and Financing of Schoolhousing

Profiles of Significant Schools

Belaire Elementary School, San Angelo, Texas
Heathcote Elementary School, Scarsdale, New York
Montrose Elementary School, Laredo, Texas
Public School No. 9, Borough of Queens, New York City

A&M Consolidated Senior High School, College Station, Texas
Hillsdale High School, San Mateo, California
Newton South High School, Newton, Massachusetts
North Hagerstown High School, Hagerstown, Maryland
Rich Township High School, Rich Township, Illinois
Wayland High School, Wayland, Massachusetts